AMENDMENTS TO THE SPECIFICATION

Please amend the specification as indicated hereafter. It is believed that the following amendments and additions add no new matter to the present application.

In the Specification:

Please amend the paragraph starting on page 13, line 24 – page 14, line 2 as follows:

The present invention fulfills this need using an adaptive bandwidth allocation manager that dynamically allocates available bandwidth between the DTCs based on allocation criteria which comprises at least one subscriber criteria received from a subscriber. Referring now to FIG. 4, there is shown a high-level representation of a headend according to one possible embodiment of the present invention. In this embodiment, the bandwidth allocation manager **125** is located at the headend **26** of the DBDS **10** as shown in FIG. 1. The headend **26** contains a video server [[**110**]] **113**, a video-on-demand application server **115**, a network manager [[**120**]] **121**, a billing ~~server~~ system [[**130**]] **127**, and the bandwidth allocation manager **125**. It should be appreciated that although single components (e.g., video server [[**110**]] **113**, video-on-demand application server **115**, network manager [[**120**]], **121** etc.) are illustrated in FIG. 4, a headend **26** can feature a plurality of each of the illustrated components or may be configured with alternative embodiments for any one of the individual components. It should also be appreciated that, although the VOD application server **115**, bandwidth allocation manager **125**, network manager [[**120**]] **121**, and billing system [[**130**]] **127** are shown as separate components, these components may be combined into one or more components with similar functionality without altering the novel aspects of the present invention.

Please amend the paragraph starting on page 14, lines 3-11 as follows:

The video server [[**110**]] **113** serves as a repository for storage of video content such as digital movies. Each movie may be represented by a single "normal play" compressed video stream or, alternatively, by multiple streams representing different playback speeds and

directions. For example, a single movie may be stored as three separate video streams, one for normal play, one for fast forward and one for reverse. The video content may also comprise content formatted for specific content delivery modes such as VOD or NVOD modes, some of which are described above. The video content is typically transferred from remote content providers **18** as shown in FIG. 1 and stored to the local video server [[**110**]] **113** where it can be made available as video streams to the other equipment located within the headend **26**.

Please amend the paragraph starting on page 14, lines 12-27 as follows:

The VOD application server **115** coordinates the various parts of the system and records transaction and state information in a database. It also communicates with the billing system [[**130**]] **127** to insure that subscribers are charged the appropriate rate for any VOD services that may be provided. In addition, the VOD application server **115** manages the loading of video content such as movies or other programs into the video server [[**110**]] **113** from content providers and creates a list of available video titles and associated VOD data. Part of the VOD data, such as the VOD Catalogue, may be transmitted to the DHCTs **14**. Other parts of VOD data may be reside in the VOD server and be accessible to subscribers on an on-demand basis. For instance, movie previews may be requested by employing the OOB channel to carry the subscriber's request from the DHCT **14** to the VOD application server **115** to view the desired movie preview. The VOD application server **115** also manages a self-contained database and communicates with the network manager [[**120**]] **121** to coordinate the delivery of the VOD services from the video server [[**110**]] **113** to the DHCT **14**. It is also common for the VOD application server **115** to accept commands from a system administrator through an administration graphical user interface (GUI) to set the parameters and configurations of the VOD components throughout the DBDS. The Administration GUI (not shown) enables the system administrators to configure the system and review past activity.

Please amend the paragraph starting on page 14, lines 28-35 as follows:

The network manager [[**120**]] **121** provides control and communication functionality by monitoring the DHCTs **14** and facilitating messaging between the DHCTs **14** and components within the headend **26.** When any of the communication functionality is provided by headend components other than the network manager [[**120**]] **121**, the network manager

[[120]] 121 indirectly provides similar functionality by providing the control and coordination to those other devices that provide the required communication functionality to enact the services. The network manager [[120]] 121 also preferably controls the multiplexing of media and data for transmission and reception over the HFC access network **38** and manages the provision of services over the DBDS **10**.

Please amend the paragraph starting on page 14, line 36 through page 15, line 4 as follows:

The network manager [[120]] 121 also typically includes a session manager module and a conditional access system. The session manager module uses the MPEG-2 DSM-CC protocol to coordinate on-demand sessions as described in further detail below. The conditional access system communicates with the DHCTs **14** and the billing system [[130]] 127 to determine whether a particular subscriber is authorized to receive particular content. If a DHCT **14** is not authorized for certain services, the conditional access system insures that such services are not transmitted.

Please amend the paragraph starting on page 15, lines 5-10 as follows:

The billing system [[130]] 127 communicates with the VOD application server **115** and the network manager [[120]] 121 to calculate and process subscriber fee information. Information pertaining to fees associated with respective VOD services or other services may be stored locally in the memory **112** of the DHCT **14** and displayed for subscriber viewing via the presentation of a graphical user interface. The billing system [[130]] 127 may also communicate directly with bandwidth allocation manager **125** to provide adaptive billing information.

Please amend the paragraph starting on page 15, lines 19-31 as follows:

Referring still to FIG. 4, in one embodiment of the present invention, the bandwidth allocation manager **125** is in communication with the VOD application server **115**, the network manager [[120]] 121, and, preferably, the DHCT **14**. It will be appreciated by one of ordinary skill in the art, however, that such communication can be established in a number of ways and does not require that there be a direct connection between each of the components. For example, the bandwidth allocation manager **125** may communicate with the VOD

application server **115** indirectly by transmitting and receiving information to and from the network manager [[**120**]] **121** which then communicates with the VOD application server **115.** Similarly, the bandwidth allocation manager **125** may communicate with the DHCT **14** indirectly either through the network manager [[**120**]] **121** or through the VOD application server **115**. Likewise, any communication can be established with any headend component that interfaces a first VOD component to a second VOD component. The bandwidth allocation manager **125** may receive one or more allocation criteria from any one of the above referenced components in communication with the bandwidth allocation manager.

Please amend the paragraph starting on page 16, line 29 through page 17, line 20 as follows:

According to another aspect of the present invention, the bandwidth allocation manager **125** allocates the available bandwidth based on allocation criteria comprising a subscriber criteria received from a subscriber, such as a request for a VOD service according to one or more subscriber preferences as discussed above. To appreciate the advantages of the present invention, it is useful to first set forth a common method used to fulfill a VOD request. In a typical DBDS, for each VOD request it is necessary to set up a "session" between the DHCT **14** and the video server [[**110**]] **113**. A session is a logical entity used to define a connection between the DHCT **14** and the video server [[**110**]] **113** and the resources used to maintain that connection in the DBDS. The signaling required to implement the session is defined by the MPEG-2 standard's ISO/IEC 13818-6 IS (MPEG-2 DSM-CC). Upon a session setup request generated by the DHCT **14** (usually in response to a request from a subscriber), the network manager [[**120**]] **121** verifies the eligibility of the DHCT **14** to receive the VOD service being requested and then passes the request to the VOD application server **115**. If the VOD application server **115** determines that it can deliver the service, it communicates with the network manager [[**120**]] **121** to reserve the network resources required to deliver the VOD service. The network manager [[**120**]] **121** allocates the requested resources, including the necessary bandwidth, and sends a message back to the VOD application server **115** to indicate that the requested resources have been allocated. This message contains MPEG-2 transport stream ID, identifying the physical connection from the

video server [[**110**]] **113** to the headend **26**, and the connectivity from the QAM **135** to the Hub **34** in which the DHCT **14** is connected. The amount of bandwidth that will be reserved for the duration of the VOD session is also communicated. The VOD application server **115** sends a message to the DHCT **14** that indicates that it is ready to begin delivering the video content using the resources allocated. The DHCT **14** receives information in the message identifying the QAM Modulator that is transmitting the video content (and hence where to tune to receive the requested content) and the bandwidth allocated to deliver the service. After a session has been established, the DHCT **14** communicates directly with the VOD application server **115** to facilitate delivery of the requested VOD service. Throughout the course of time that a VOD service is active further messaging is conducted between the respective DHCT **14** receiving the VOD service and the VOD application server **115** to monitor the status of the session. Thus, the VOD server can monitor that a session is properly functioning and determine whether the subscriber has invokes any random access feature of the VOD service.

Please amend the paragraph starting on page 17, line 21 through page 18, line 9 as follows:

The procedures for requesting and delivering of a VOD service can be quite complex, especially when there are more requests than there are available VOD bandwidth resources. Advantageously, according to one aspect of invention, the bandwidth allocation manager **125** eliminates some of these problems by dynamically determining bandwidth allocation based on the subscriber criteria. Because the bandwidth is not pre-allocated to certain types of DTCs that transmit content according to predetermined delivery modes, the bandwidth allocation manager can dynamically adjust bandwidth allocation in response to a subscriber criteria. This allows the bandwidth allocation manager **125** to either set up a VOD session according to several well-known methods such as that described above, or to choose an alternative delivery method to broadcast the requested VOD service without necessitating a VOD session. For example, since the bandwidth allocation manager **125** receives the subscriber request prior to determining a bandwidth allocation schedule, the bandwidth allocation manager **125** has the option to fulfill the request using any available bandwidth. Hence, if no or a small number of

subscribers have requested a particular movie that is planned to be transmitted according to a pay-per-view model, then the bandwidth allocation manager can "recapture" that bandwidth and allocate it to fulfill a subscriber request during the same time period if it is to result in a more financially advantageous bandwidth allocation. Additionally, when a movie is paused or stopped for a significant period of time, the VOD application server **115** may communicate to the network manager [[**120**]] **121** and/or the bandwidth allocation manager **125** that the bandwidth allocated to the respective DHCT **14** consuming the VOD service may be reallocated. The bandwidth allocation manager may also aggregate multiple subscriber requests for the same VOD service that are received at approximately the same time. Instead of allocating bandwidth to fulfill each subscriber request, the bandwidth allocation manager **125** may instead choose to fulfill the subscriber requests by delivering the requested VOD service according to an alternative delivery mode such as broadcasting the requested service according to one of the NVOD models described above. Hence, the bandwidth allocation manager **125** uses the subscriber criteria received from a subscriber to determine the bandwidth allocation schedule.

Please amend the paragraph starting on page 18, line 25 through page 19, line 2 as follows:

In one embodiment of the present invention, after selecting the date and time of the reservation request, the subscriber enters input via an input device, such as infrared remote control device, that instigates the DHCT **14** to transmit a message to the network manager [[**120**]] **121** requesting that the network manager [[**120**]] **121** reserve the necessary resources to transmit the video content at the requested time. This messaging can be accomplished using communication capabilities facilitated by the two-way DBDS network and the two-way capable DHCT **14**. Alternatively, in a one-way network, DHCT **14** can communicate data to the headend via a telephone modem. The network manager [[**120**]] **121** then communicates the subscriber reservation request to the bandwidth allocation manager **125**. It will be appreciated that the bandwidth allocation manager **125** may be configured so as to communicate directly with the DHCT **14**, thus eliminating the need for the message to be passed through the network manager [[**120**]] **121**. After the subscriber reservation request is

received by the bandwidth allocation manager **125**, it is stored by the bandwidth allocation manager **125** until such time as the bandwidth allocation manager **125** initiates a bandwidth allocation event. Alternatively, the reservation request may be stored in the network manager [[**120**]] **121** and retrieved by the bandwidth allocation manager **125** when it begins a bandwidth allocation event.

Please amend the paragraph starting on page 19, lines 23-33 as follows:

According to yet another aspect of the present invention, the bandwidth allocation manager **125** may also comprise means to transmit a message to subscribers notifying them that their reservation request has been fulfilled. The bandwidth allocation manager **125** may communicate directly with the subscriber's DHCT **14**, or it may transmit the message to the network manager [[**120**]] **121** which passes the message to the DHCT **14**. Alternatively, the subscriber can place a phone call and navigate through a phone-activated menu in which he/she enters personal information and assigned identification to learn the status of his request. Alternatively, the subscriber can employ a computer connected to the internet or DHCT **14** to use an internet browser or similar internet navigation tool to log on to a secured web site, enter a user identification and password, and learn the status of his/her request. Thus, this messaging can be accomplished using any of several methods well known in the art.

Please amend the paragraph starting on page 20, lines 20-33 as follows:

In a preferred embodiment, the bandwidth allocation manager processes the allocation criteria according to a statistical model that is designed to result in a bandwidth allocation suitable for a particular goal. The statistical model may assign different weights to different allocation criteria in order to emphasize the impact a specific criteria has on the bandwidth allocation schedule. The statistical model can be predetermined to produce a particular result such as maximizing the total number of subscriber requests fulfilled (such as requests for VOD access and pay-per-view access) or maximizing the revenue generated from the available bandwidth. For example, if the bandwidth allocation manager [[**130**]] **125** receives a large number of requests for particular video content such as a popular movie to be transmitted at approximately the same time, the bandwidth allocation manager **125** may

allocate several channels to broadcast that content according to an NVOD delivery model so that the most highly requested video content is available without necessitating initiation of a VOD session. The bandwidth allocation manager **125** may also provide the ability to broadcast the video content in progressively non-decreasing staggered start times or non-linear time-spaced intervals so that a greater number of subscriber requests can be fulfilled.

Please amend the paragraph starting on page 23, lines 3-13 as follows:

According to another possible bandwidth allocation schedule, a multiplicity of time-adaptive schedules for each of a multiplicity of recurring schedule choices are pre-configured . In this embodiment, the cable system operator may monitor the bandwidth and on-demand service usage and be given the option of manually implementing one of the pre-configured allocation schedules without following a plan. Alternatively, the network manager [[**120**]] **121** may automatically monitor bandwidth usage and on-demand service usage and the bandwidth allocation manager **125** may communicate with the network manager [[**120**]] **121** and the VOD application server **115** to automatically select one of the pre-configured schedules. For instance, six different configurations may be available for time-adaptive management of the bandwidth allocated for movie viewing and on-demand services for a daily recurring schedule. On the other hand, more than six different arrangements may be necessary when implementing time-adaptive bandwidth management on a weekly recurring schedule.

Please amend the paragraph starting on page 25, line 30 through page 26, line 2 as follows:

According to another aspect of the invention, the bandwidth allocation manager **125** communicates with the network manager [[**120**]] **121** to allocate the predetermined bandwidth according to the bandwidth allocation schedule determined by the bandwidth allocation manager. This may be accomplished by transmitting the bandwidth allocation schedule to the network manager after each bandwidth allocation event. Thus, the bandwidth allocation manager may continually communicate with the network manager to dynamically allocate bandwidth according to each new bandwidth allocation schedule. Bandwidth allocation entails an assignment of system resources for a time interval for delivering a video service

requested by a subscriber according to the bandwidth allocation schedule. A time interval is characterized by a specific start time and duration.